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CENTRAL INTELLIGENCE AGENCY

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COUNTRY	East Germany	REPORT	
SUBJECT	Development of Catalytic Cracking Processes at VEB Leunawerke "Walter Ulbricht".	DATE DISTR.	21 December 1956
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SOURCE EVALUATIONS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE

1. As of May 1956, VEB Leunawerke "Walter Ulbricht" was engaged in the development of catalytic cracking processes. These processes proceed by different methods but are similar in that the products are gases and that the cracking reaction takes place in the presence of a catalyst which is brought in either by a fluidized or moving bed, and/or a fixed bed. An exception is the physical state of the cracking process where it is assumed that the reaction takes place in the liquid phase. Fuller's earth is used as a catalyst, and is prepared in the following manner: The kaolin or fuller's earth comes from a bin via a continuous weigh feeder into a ball mill. In this ball mill the fuller's earth, to which is added a grinding oil, is ground to a fineness of about one.[1]

2. The catalyst mash thus obtained passes to a stirring container and, in order to avoid settling, is stirred as well as pumped around. In order to obtain an exact and accurate mixture of this mash to the charge stock, the mash is drawn off from the bypass pump into a proportioner where it requires over an hour to pass through. Then it is recycled through the same process before it is mixed in a measured quantity with the charge stock. This charge stock is a pre-hydrogenated mineral oil. It is pumped out of a storage tank into a proportioner to measure the exact amount used.

3. While the charge stock is brought to a pressure of 100 atmospheres through the use of hydraulic pressure pumps, the catalyst mash is also brought to 100 atmospheres by use of mechanical pumps. Separate pressure systems are necessary because of stuffing box difficulties. The two streams are now brought together in such proportions that 1000 liters of charge stock contain about five percent of the catalyst. This mixture enters the preheater and then the reactor. Both are structural elements which consist of a series of U-shaped reactor tubes; they are identical except for the fact that the twelve preheater tubes are ribbed and the eight reactor tubes are unribbed. Since in this process the tubes very easily collect deposits of carbon, the U-shaped end pieces are located outside the heating chamber and can

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be taken off. Although this causes a large heat loss, it nevertheless permits easier cleaning in case of clogging.

4. To avoid too high a temperature and uneven heating which promotes carbon deposits, circulating gas heating is employed at a temperature of 680° C. The temperature in the reaction tubes is maintained at a temperature of 540° C by controlling the flow of the feed stock. The reactor has a capacity of 50 liters, and the charge stock is fed at a rate of 1000 liters per hour, which allows for a reaction time of approximately 3 minutes. The flue gases leave the oven at about 200° C. The products of the cracking reaction are cooled quickly in a heat exchanger to about 200° C to avoid any after polymerization. The reaction products then are passed into a fractionator.

5. In the fractionator the catalyst, which has been carried along and which has been covered with carbon from the cracking reaction, is separated from the gasoline that has been formed (still gaseous). At the same time the other gaseous fractions are separated. The catalyst together with the other residual products including unreacted feed stock is led into a centrifugal separator where the catalyst is separated from the residual oil. The latter is recycled after being replenished with fresh feed stock. The gaseous gasoline which has been formed passes to a condenser and then to a stripper for removal of the more volatile fractions.

6. A separation of the carbonized catalyst from the residue and tarry constituents has not yet been devised. At the present time, extensive tests are being conducted on this problem. Because of the fineness of the catalyst (in part smaller than 0.5 micron), it is doubtful whether it is feasible to attempt recovery of the catalyst. In any case, however, the catalyst and residue are burned to remove the carbon as a fuel source. This process gives approximately a 42 percent yield based on a prehydrogenated mineral oil feed stock. Cracking the raw crude oil directly has not been possible at this time.

7. The analysis of the end product gasoline is as follows:

Specific weight at 15° C	0.78
Octane number	73
Iodine number	133
Volatile fractions mg/100 cc	6.2

Analysis by boiling point range:

43-75° C	75-100° C	100-150° C	150-200° C	200-225° C
9.5%	17%	32.5%	56%	80.5%

[redacted] Comment: Undoubtedly this number refers to either the particle or sieve size, but since the units are not known, it is a meaningless term. The ball mill will allegedly reduce the raw fuller's earth to 0.5 micron particle size. 25X1

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25X1 diagram illustrating the various steps of the Leuna catalytic cracking processes, as described in the above report. (1 diagram, 1 sheet)

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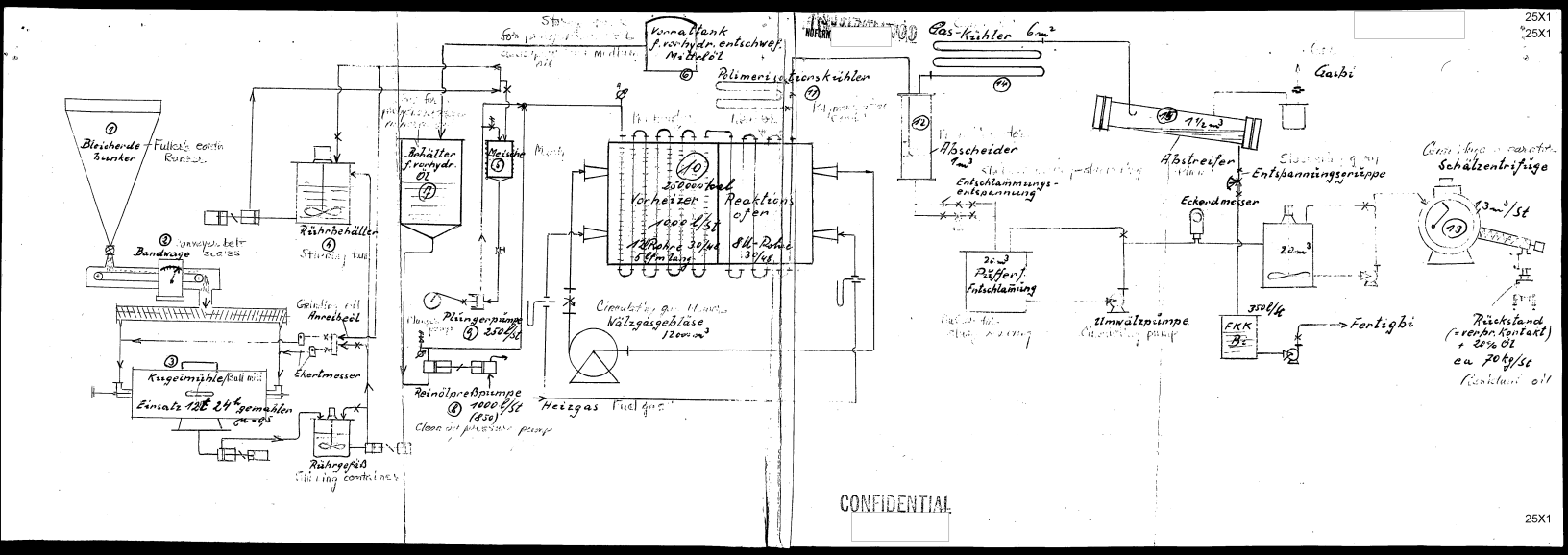

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